

constrained user interface hardware **310**. As shown in **FIG. 3**, the device-specific hardware **310** typically includes a display surface and input buttons. In touch-screen-based embodiments the display surface and the input areas may overlap entirely or partially. Also, other types of user interfaces such voice input-output may be added or substituted in some embodiments to supply the area-constrained user interface.

[0042] Also shown in **FIG. 3** is an optional mouse button **315**. This mouse button may also double as a button supplied by the area-constrained user interface **310**. Also, an external mouse device **317** may be used. The mouse device is used to control a cursor and to make user selections on a non-area constrained display surface **320**. The non-area constrained display surface is a flexible-retractable display surface such as a flexible LCD or LPD monitor. As discussed previously, the flexible-retractable display surface **320** can be pulled out of the hand-held enclosure **305** using a roller or an accordion-style retraction technique. Much like a window blind, the display surface **320** can be pulled out of the enclosure **305**. Also like a window blind, the display surface can be rolled back (retracted) into the enclosure **305** when it is no longer needed. Either a window blind retraction technique or a motorized retraction technique may be used to retract the display surface **320** back into the enclosure **305**. Other extension-retraction techniques may be applied, but a roller is preferred.

[0043] An optional second extension/retraction module **325** is provided to allow a second flexible-retractable peripheral to be extended and retracted. The second and optional extension/retraction module **325** uses a roller or similar technique for extension and retraction as discussed in connection with **FIG. 4**, the second and optional extension/retraction module **325** can be hinged or can be pulled down either by the user or under the control of a motor such as a stepper motor.

[0044] In an alternative embodiment, as discussed in connection with **FIG. 5**, the flexible-retractable peripherals **320**, **330** are provided in stand-alone enclosures separate from the enclosure **305**. Also, as discussed in connection with **FIG. 5**, the flexible-retractable peripherals **320**, **330** may optionally use a set of movable links to provide rigidity in one or more dimensions to the flexible peripherals once they are extended.

[0045] Turning now to **FIG. 4A**, a back view of an embodiment of the hand-held mobile unit **300** is illustrated. A cavity **322** is built into the enclosure **305** to house the extension/retraction module **325**. In this embodiment, a hinge **335** is used to allow the extension/retraction module **325** to flip out from the enclosure **305**. Once the extension/retraction module **325** is flipped out on its hinge, the user can pull out the flexible-retractable peripheral **330**. Likewise, a motor in the extension/retraction module **325** can cause the flexible-retractable peripheral **330** to be extended. For example, this motor can apply torque to a roll-up cylinder around which is wrapped the flexible peripheral **330** when in a retracted state. Also shown in **FIG. 4A** are optional placeholders **321** and **331**. For example, suction cups can be used to hold the flexible peripherals **320** and **330** in place once they are in their extended states. As discussed in

connection with **FIG. 5**, a plurality of movable links can be also be used to lock the peripherals **320** and **330** in place once they are extended.

[0046] **FIG. 4B** is a schematic drawing illustrating a bottom view of an embodiment of the hand-held mobile unit **305** implemented with a flexible-retractable peripheral that uses a downward protruding support structure. In this figure, the area-constrained UI surface is pointing downward and the back of the mobile unit **305** is pointing upward. On the bottom face **326** of the mobile unit **305** is a hinged cover **337** connected to a hinge **338**. In some embodiments the hinged cover **337** may not use a hinge but instead a pocket-sliding door arrangement that is coplanar with the bottom face **326**. In either case, an opening is provided whereby the extension/retraction module **325** can be extended and retracted from the cavity **322** via a bottom opening **327**. The extension/retraction module **325** can be pulled down or can be pushed down by a mechanical force (e.g., spring or motor generated). Once extended, the extension/retraction module **325** looks substantially the same as in **FIG. 4B**, except instead of coming out of the cavity **322** via a hinge, the extension/retraction module **325** protrudes downwardly from the bottom opening **322**. Once the extension/retraction module **325** is extended into its downward protruded state, it can be used to extend and retract the flexible peripheral surface **330** as previously discussed. In embodiments where a crank is used, the crank is preferably implemented as a flip-out lever on the bottom of the extension/retraction module **325**. Such cranks are similar to those used in some cameras to crank film. The flexible peripheral **320** can be pulled, cranked, pushed out by a stepper motor, or otherwise extended using from its retracted position using a side access **322**.

[0047] **FIG. 5** is a schematic drawing illustrating a stand-alone flexible-retractable peripheral device **500** with a linked rigidity support system **520**. A stand-alone enclosure **505** is used to house a flexible-retractable peripheral **515**. The shape of the enclosure **505** is rectangular or cylindrical. The exact shape of the cross-section of the enclosure **505** can be modified without departing from the scope of the present invention. Similarly to the mobile phone **300**, the stand-alone flexible-retractable peripheral device **500** includes a side opening and an extension/retraction member such as a roller. The roller can be operated manually like a window blind, cranked, or can be operated using a motor as previously discussed. The roller is used to extend and retract the flexible-retractable peripheral **515**. As previously discussed, other extension/retraction means such as an accordion-style folding arrangement can also be used in some embodiments.

[0048] Into the enclosure **505** or onto the flexible peripheral **515** are built a set of interface and control circuits **510**. The interface and control circuits, for example include power supply circuits and a Bluetooth™ personal area network interface protocol stack that allows the stand-alone peripheral **500** to be coupled to a generic mobile unit such as a smart phone or a video player that has a Bluetooth™ LAN capability but no indigenous flexible-retractable peripherals. The stand-alone flexible-retractable peripheral device **500** includes an antenna **512**. In a preferred embodiment, the antenna **512** is flush with the enclosure **505** or is otherwise built into the enclosure **505** so that it does not protrude from the enclosure **505**. Also, while Bluetooth™ is used by way of example, other short-range wireless air interfaces may be